Causes and effects of coronary heart disease

Coronary Heart disease, or CHD as it is abbreviated, is one of the UK's biggest causes of death, with one in every four men and one in every six women dying from the disease in the UK alone (nhs. co. uk). CHD is defined by the Medical Dictionary as ' a heart disease due to an abnormality of the coronary arteries, obstructing the delivery blood and oxygen to the heart' (medicaldictionary. com) and ' a condition that reduces blood flow through the coronary arteries to the heart.' (Mariame-Webster,(1995), p. p 141) An ischemia is the medical term used to describe a restriction of blood flow and is one of many key concepts when discussing CHD; a coronary ischemia may lead to chest pains or angina pectoris. Angina pectoris is commonly cause by atherosclerosis, a narrowing of the blood vessels which in turn restricts sufficient flow of blood and oxygen reaching the heart, the narrowing is the result of fat and cholesterol build up within the artery. If the flow is restricted for too long and insufficient blood and oxygen levels reach the heart the individual will suffer a heart attack or myocardial infarction as it is medically known. These are serious and can be fatal, in the UK alone there are approximately 124, 000 heart attacks each year. In 2006 11% of men admitted for myocardial infarction had died within 30 days compared to 15% of women, showing fatalities are higher in women (heartstats. org). There are many risk factors which can be attributing factors to the progression of CHD, many of which will be discussed within the next chapter.

Pathophysiology of Coronary Heart Disease:

As previously touched upon, Coronary Heart Disease is caused by a build up of fat deposits within the coronary arteries and more than 110, 000 people in the UK die each year because of this condition. These fatty deposits or

atheroma as they are medically termed are a mixture of cholesterol and other waste products which cause a narrowing in the endothelium of the arteries. The endothelium is the innermost layer of the arteries; it is made of a thin layer of endothelial cells which leave a smooth coating allowing the blood to flow through easily. However if the endothelium becomes damaged, Phagocytic cells migrate to the damaged area which starts accumulating lipids. Fatty deposits build up, causing a narrowing in the arteries, connective tissues form from the smooth lining to repair the damaged site. The process in which the arteries narrow due to the build up of these fatty deposits (atheroma) is known as atherosclerosis. Many people would believe that atherosclerosis is a disease of the elderly; however this is not strictly true, it would be more appropriate to acknowledge it as a paediatric disease, as the pathological changes that lead to its development are present in infancy and continue to progress throughout childhood (Wilmore J, Costill D & Kenney L, 2008 p. p 473). The first stage of atherosclerosis is found in infancy, at this stage the effects are highly reversible and consist of fatty streaks being revealed in the aortas of 3 to 5 years old children. It’s not until puberty and after that the more harmful stage occurs, the development of atherosclerotic plaques in the arterial walls, atherosclerotic lesions are visible in adults aged 25 and over.

There are three different categories of risks that can influence the chances of a person developing CHD, these are lifestyle factors such as; smoking, eating a poor diet (particularly high in animal fats), inactivity, high stress levels and obesity, biomechanical/ physiological factors; high blood pressure (hypertension), high blood cholesterol levels, and finally personal factors

such as age, gender, close family history and personal history. Some of these risks factors are modifiable and can be changed to slow down the risk of developing CHD, unfortunately some risk factors are immodifiable and cannot be changed in order to reduce the chances of developing CHD.

Modifiable risks are the risks associated with lifestyle choices, so these are chosen by the individual. For example smoking is attributed to 19% of all CHD related mortality rates. Obesity is attributed to 6% of all CHD mortalities; the biggest modifiable risk which is attributed to over 46% of CHD mortalities is high cholesterol levels, which is due to an unhealthy diet and lifestyle. The second largest risk of all CHD related mortalities is physical inactivity with 37%, which can also be related to obesity and high blood cholesterol, making these risks interlinked. Therefore if a person suffers from more than one of these then they are more likely to develop CHD.

Age and gender are just two of the risk factors that are immodifiable. CHD increases in both men and women as they age, the risk of developing CHD and atherosclerosis is increased with age; around 1. 6 million men in the UK are diagnosed with having CHD compared to 1 million women, totalling nearly 2. 6 million. Approximately 1. 6 million of the total diagnosed are under 75 years old (heartstats. org).

Type II diabetes (diabetes mellitus) also increases the chance of a person developing CHD. Many of the risk factors interlink as it has also been discovered that people who suffer from both hypertension and diabetes have a doubled chance of developing CHD than people that only have hypertension (Mutnick A, 2004. Pp 38). Epidemiological studies have shown

that individuals who are physically active have a 30-50% less risk of developing Type II diabetes than sedentary people (Bassuk S, Manson J, 2005)

High blood pressure (hypertension) also has a direct relationship with CHD as it is attributed to approximately 13% of the UK's CHD related deaths per year. Hypertension is diagnosed when a person's systolic blood pressure is 140 and the diastolic blood pressure is 90 and above. A family history of high blood pressure is an independent predictor of CHD. A study of over 1million people showed that for each 20 mmHg increase in systolic pressure or a 10mmHg increase in diastolic pressure above the norm, increased the chances of death caused by CHD by twofold in people between the ages of 40-69 years old (heartstats. org).

The association between Coronary Heart Disease & exercise:

Physical inactivity is responsible for over 37% of all deaths of people under 75 years old that have CHD (Britton A, McPherson K, 2000). It has been well documented that exercise and physical activity can help to reduce the risks of developing many different health problems, and exercise can do the same for coronary heart disease and the related risk factors. For example a study by Jerry Morris (1953) on 31, 000 London bus workers, shown that the bus conductors had 50% less heart attacks than the bus drivers, this was because they were taking more steps in a day. The study also showed that the drivers had more fatalities from having heart attacks then the conductors did. This study is one proving that even a little exercise can help reduce heart attacks. He followed this study with another study of 110, 000 post men and civil servants in 1953, he studied these men for two years and the

results showed that the postmen had a lower risk of developing CHD than the sedentary civil workers. A 10 year study known as the Zutphen Elderly Study showed that there was a 31% deduction in CHD mortality for adult males between the ages of 64-84 years that participated in 20 minutes of moderate walking or cycling 3 times a week.

Another study on the relationship between exercise type and intensity to Coronary artery disease by Harvard University scientists Dr Blair, Dr Paffenbarger, Dr Morris and Dr Leon (2002) the study was conducted between 1986-98 on 44, 000 men. These men were followed every 2 years to assess potential risk factors. The results showed that men who ran 6 miles per hour or faster for an hour plus per week had a 42% reduced risk of developing CAD than the men that didn’t run at all. The study also showed that brisk walking for 30 minutes or more per day was associated with an 18% reduction in risk, men who trained 30 minutes or more a week with weights were 23% less likely to develop CAD/CHD than those who did no weight training at all. This was one of the first studies to indicate a relationship between training with weights and reduced CAD risk. (Wilmore, Costill and Kenney, 2002, pp 484)

However as the evidence that exercise reduces coronary heart disease may be circumstantial, Kramsch (1981) decided to conduct study on monkeys. He split them into 3 separate groups; the first group ate normal monkey food, the second group ate a high fat diet and participated in no exercise and the third group ate a high fat diet but participated in exercise. The results from this study showed that the exercising group had a higher level of higher-density lipoproteins (HDL) and lower level of low-density lipoproteins (LDL)

and very low-density proteins (VLDL) whilst the non conditioned group (group1) showed coronary artery narrowing and sudden death with their post-mortems showing coronary atherosclerosis and stenosis, the study also showed that exercising monkeys who ate the same diet as non exercising monkeys had heart hypertrophy and wider coronary arteries, which resulted in less luminal damage and lower risk of atherosclerosis.(Kramsch et al 1981)

Reducing CHD Risk- interventions:

An intervention is defined as ‘ the act of interfering so as to modify’ (medical-dictionary. com) and strategies are defined as ‘ a long term action plan to achieve a certain goal or goals’ (thefreedictionary. com). In order for the risks of developing CHD to be reduced, the NHS and the Government have developed certain health strategies for the public to participate in for a healthier, balanced lifestyle. These are not specifically aimed at CHD but they are related to reducing the risk.

There’s a strategy called ‘ Change 4 Life’ and is an NHS strategy aimed at both children and adults. Their slogan is ‘ Eat Well, Move More, Live Longer (nhs. uk/change4life), these are the 3 steps this strategy promotes to improve a person’s long life health. Change 4 Life help by including children, aiming their strategy at children they are starting a healthy lifestyle early in order to prevent health problems developing in adulthood such as heart disease, type II diabetes and cancer. The aim of change for life is to get people eating healthier foods and a balanced diet and getting people more active as they aim to decrease obesity levels, as a third of children and two thirds of adults are already obese in England (nhs. uk/change4life. marketingstrategy) and predictions for 2050 state that only 1 in 10 adults

will be healthy. An individual signing up to ‘ change 4 life for kids’ strategy will receive a welcome pack full of tips and information on how to improve a child’s lifestyle, activities in order to get them more active and meal tips to get them eating healthy. TV advertisements are aimed at families showing them what giving their children sweets and treats is doing to their health as well as showing them healthy foods and portion sizes. All aimed at reducing obesity and the related health problems e. g. type II diabetes and heart disease and starting young will help prevent CHD forming in children and developing through childhood and into adulthood. The strategy is also aimed at adults as previously mentioned, it help the adults realise what foods they should and shouldn’t be eating and recommends activities for them to participate in, in order for them to reduce their risks of developing disease such as diabetes and CHD. It recommends 30 minutes of moderate exercise, 5 times a week to maintain health and reduce risk of CHD and other disease.

‘ Sport Unlimited’ is a part of the ‘ 5 hour offer’. The ‘ 5 hour offer’ is a £100m funding that offers all 5-16 year olds the opportunity to participate in 5 hours of sport per week and 16-19 year olds 3 hours per week. ‘ Sport Unlimited’ offers an additional 1- 2 hours a week to children and teenager who are interested in sport and is in place to promote lifelong health and fitness. Starting to participate in regular sport early will help the children to learn about healthy lifestyles and how regular exercise can keep them healthy. Also starting young may increase the chances of them exercising throughout adulthood, helping to prevent early onset of atherosclerosis and other CHD related risks, as well as keeping their weight down.

Conclusion:

It is believed that over 110, 000 people die in the UK each year because of Coronary Heart Disease (CHD) and its related the risk factors, however this number could potentially be drastically reduced if the public were to be made aware of the risks and given information on how to reduce the risks especially the modifiable risk factors as many of them interlink and increase the chances of developing CHD. Smoking, inactivity and high blood cholesterol are the highest attributed risks to the mortality rates in the UK. In recent years the government and NHS have been trying to reduce health risks by developing strategies aimed at healthier lifestyle choices, these could help reduce CHD development. Advice, leaflets and TV/radio advertisements are just a few of the ways that the government and NHS are trying to get their message across. If everybody lived a healthier lifestyle the risks on developing life threatening illnesses would be significantly decrease, therefore a healthy balanced diet, exercise and weight management could all help to reduce the risks of developing CHD.